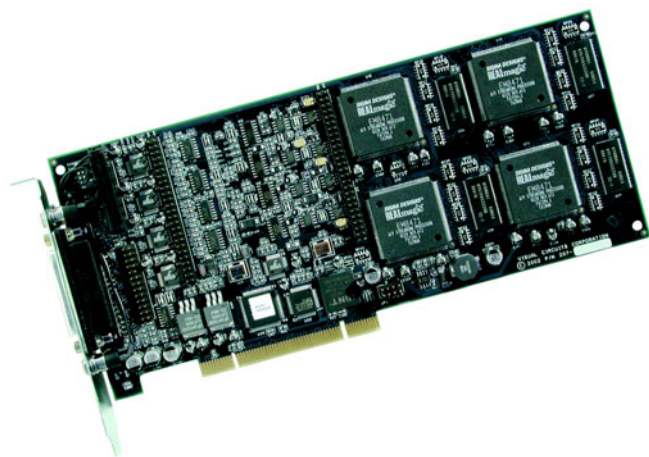




Harmony 2ES and 4ES



User Manual

Part Number: MANL-1086-01

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Harmony 2ES and 4ES, User Manual
Part Number: MANL-1086-01

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Product Information

For the latest information about Focus Enhancements products visit www.focusinfo.com.

Regulations and Safety



Focus Enhancements, Inc.
1370 Dell Avenue
Campbell, CA. 95008

Model Number: Harmony

Date of Manufacture:
Reference the Serial Number label attached to
the unit.

Class A Statement FCC Part 15 (EN61000-3-2)

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 (EN61000-3-2) of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with this instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his or her own expense.

The Harmony 4ES complies with Part 15 (EN61000-3-2) of the FCC rules.

Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference that may cause undesired operation. The Harmony 4ES complies with Part 15 (EN61000-3-2) of the FCC rules.



WARNING- Unauthorized Modifications and Repairs

Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Symbols Used in This Documentation



Important Information the User Should Read

This symbol indicates information about conditions or actions that could result in damage to the device or data.



Information of Interest to the User

This symbol indicates supplementary information about features, functions, or operations that may be of interest to the user.

Documentation

Read, Retain, and Follow Instructions

All the safety and operating instructions should be read before the product is operated.

- **Retain Documentation**

Place documentation in a secure place for future reference on operating and safety instructions.

- **Follow All Operating and Safety Instructions**

- **Pay Attention to All Warnings**

Warnings are provided to protect the operator, the equipment, and content.

Industry Canada

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

EMC and Safety Directive Compliance



The CE mark is affixed to this Focus Enhancements Corporation product to confirm compliance with the following European Community Directives:

Council Directive 89/336/EEC of 3 May 1989 on the approximation of the laws of Member States relating to electromagnetic compatibility.

And

Council Directive 73/23/EEC of 19 February 1973 on the harmonization of the laws of Member States relating to electrical equipment designed for use within certain voltage limits:

Each amended by Council Directive 93/68/EEC of 22 July 1993 on the harmonization of CE marking requirements.

Class A Warning (EN55024, EN55022)

In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

All specifications are subject to change without notice.

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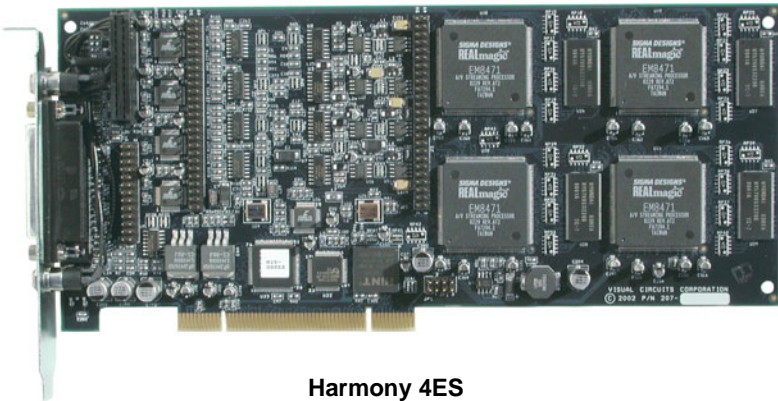
Overview

Harmony 2ES and 4ES

Harmony cards offer a wide range of scalable and adaptable features, including NTSC/PAL transcoding and Dolby Digital™ output, making them ideal for looping, scheduled, or on-demand video applications.

The Harmony 2ES and 4ES share similar features and capabilities. The primary difference between the two cards is the number of channels they provide: the 2ES has two channels and the 4ES has four. For simplicity, this manual refers to either the 4ES or Harmony. Where differences between the two cards do occur, an icon indicates 2ES information.

2ES



Harmony 4ES

Technical Description

The Focus Enhancements Harmony 2ES™ and Harmony 4ES™ cards are PCI MPEG decoder cards that support respectively, two or four independent outputs (channels) of high-quality video playback. These Harmony cards have their own unique driver and API structure designed to offer maximum compatibility with Focus Enhancements ReelTime series cards.

The Harmony 4ES simultaneously outputs composite and high-quality S-video, along with either Dolby Digital audio or Stereo PCM audio via S/PDIF. Alternately, Harmony 4ES can also output RGB (sync on green) or component video.

Maximum Number of Cards in a Server

The maximum number of Harmony cards supported by a server depends on the method used to configure their operation.

Vidserve

Standard implementation using the **Harmony Vidserve** program permits a maximum number of 6 Harmony cards with a possible total of 24 channels.

Serial Command Interface

Using the **Serial Commands** interface and information provided in the Harmony SDK, the server may contain 8 Harmony cards with a possible total of 32 channels

On Screen Display

The Harmony also supports a dynamic On Screen Display (OSD) of 256 colors with varying degrees of transparency. Since all video decoding is performed through hardware, not only can a single four-channel card run in four independent outputs, but six cards are supported in the same server as well. The Windows 2000/NT driver also includes a Software Developers Kit (SDK) with libraries and a sample program allowing flexibility and customization.

Cabling

There are two cabling options for connecting the video servers to output devices and both follow all standard audio/video cabling procedures.

- **Universal Cable:**

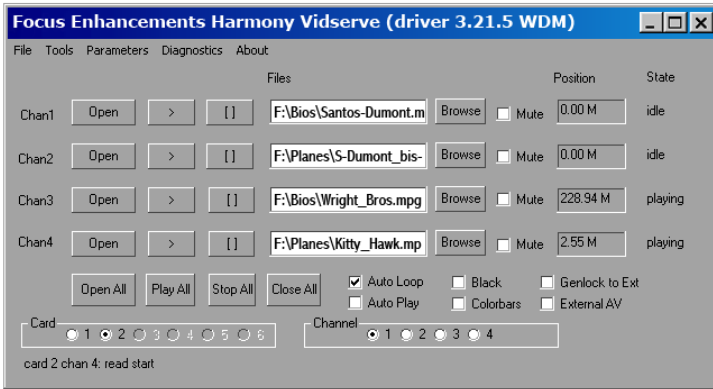
This cable supports all board configurations and comes as a 16-inch cable which attaches to each board's DB 25. All output connectors are RCA female type, requiring appropriate adapters and patch cables. For more information, see **Universal Cable** on page 75.

- **Audio Cables**

Cables with 1/8 inch (3.5 mm) stereo phone plugs to two phono (RCA) plugs may be used to connect the Harmony 4ES digital audio outputs to an external audio receiver/decoder. The output labeled **CH1/2** is designated for channels 1 & 2 and the output labeled **CH3/4** is designated for channels 3 & 4.

Focus Enhancements does not carry cable adapters and accessories. For cable pinout see **AV Breakout Cables** on page 72.

Harmony Vidserve User Interface



Harmony Vidserve application is a basic toolkit that allows the user to:

- Configure the Harmony board for playback operation.
- Test MPEG files for compatibility with the Harmony board.

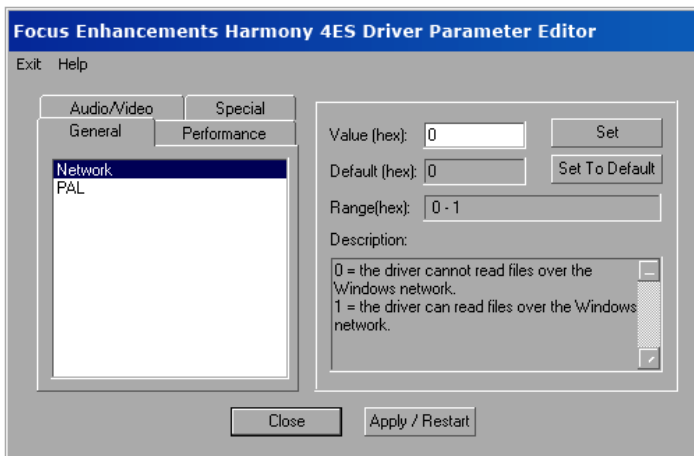
Vidserve's main dialogue box provides access to a variety of functions, input, and information screens. For more information, see **Vidserve** on page 33.

Harmony 4ES Application Interface (API)

The source code for the Harmony Vidserv program is provided for developers as an example of how to access the driver. The current version of the driver uses a proprietary C API interface, instead of a standard interface like MCI or Direct Show. Applications can use the driver by calling the dynamic link library, **4REELAPI.DLL**. The files needed, **4REELAPI.LIB** and **4REELAPI.H**, are provided in the **Vidserv.ZIP** file, along with the source code and MS VC++ 6.0 project makefile for Harmony Vidserv. **4REELAPI.H** declares all of the functions available in the driver library.

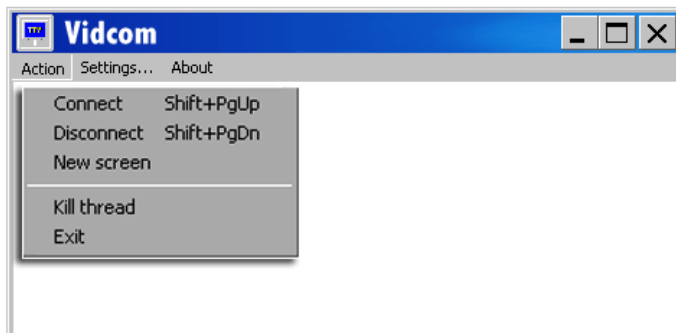
Refer to the Harmony SDK manual for more information.

Harmony Driver VccReg.exe Editor Interface



The Driver Editor allows the user to access and change the Harmony API driver parameters. For more information see **Editing Driver Settings** on page 45.

Vidcom Serial Command Interface



The Focus Enhancements Vidcom application provides a serial command interface for editing and sending commands via a direct connection to the server.

For more information, see **Vidcom Supported Serial Commands** on page 54.

Installation Guide

The Focus Enhancements Harmony 4ES decoder board is a 3/4 sized PCI card. The card is secured using an IO mounting bracket secured to the chassis. This bracket is affixed to the 25-pin female D-Sub output of the board.



Verify Harmony Card is Properly Seated in PCI Slot

If a card is not seated securely in the PCI slot when the system power is applied, damage to the Harmony 4ES board may occur. It is possible to damage system components, primarily the system's main board, if power is applied to an improperly seated card.

Do Not Force Board into PCI Slot

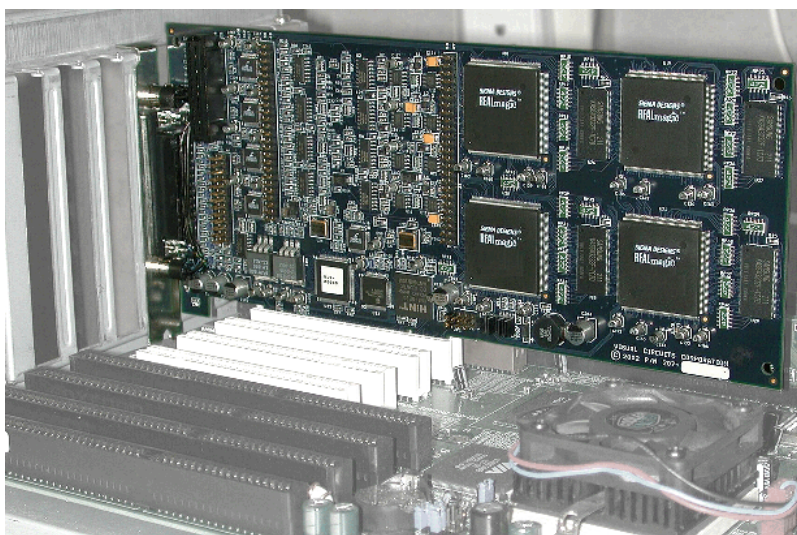
Whenever installing a board, never force the board into position. During the installation if pressure or tension is noted, stop immediately and refer to the chassis manufacturer's specifications for card installation and placement.

ESD

Follow all necessary precautions when handling electrical circuit boards. Damage can occur due to frictional contact with board circuitry or due to electrostatic discharge (ESD).

Card Installation

To install the card, carefully slide the board into the selected PCI or PCIX slot of the main board. Ensure that the bracket is aligned with the IO opening of the chassis and that the outer edge of the card rests securely according to the chassis' design. Consult with the chassis manufacturer for specific guidelines



iNote

Adjust PCIX Bus Speed for Harmony Cards

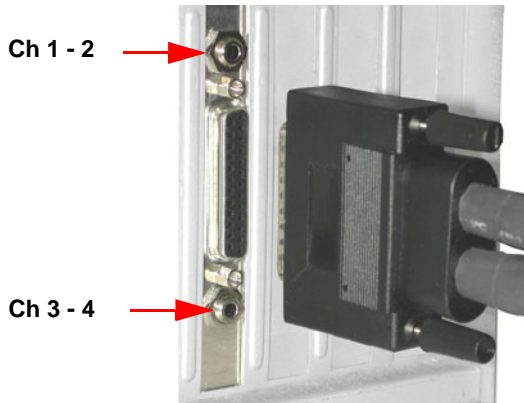
Harmony cards may be installed in either PCI or PCIX slots. However, with PCIX it is necessary to set the PCIX bus speed to 33 MHz to match the Harmony's onboard clock.

Installing 2ES and 4ES Cards in the Same Server

If both the 2-channel 2ES and 4-channel 4ES cards are to be installed in the same server, it is important to install the 2ES cards in the slots closest to the CPU. This is necessary for correct mapping of channels: see **Multiple board server - channels mapped incorrectly** on page 64.

Cable Installation (A/V Breakout)

1. Back the set-screws off fully before attaching the cable.
Do Not Use the attaching screws to pull the cable onto the female D-Sub connector of the board.
2. Orient the D-Sub on the cable properly and apply slight even pressure while connecting the D-Sub.
3. Secure the Universal Cable in place with the two screws.
4. Attach the patch cables to the **Universal Cable** as per the installation.
5. If required, connect the **Y-adapter audio cables**, (1/8 inch/ 3.5 mm stereo phone plug to two RCA plugs), from the Harmony card's digital audio output jacks to the proper inputs on an external audio receiver/decoder. Note that the audio output jack labeled **CH 1-2** is designated for channels 1 & 2 and the second audio output jack labeled **CH3- 4** is designated for channels 3 and 4.



Note

Apply Strain Relief When Attaching Patch Cables

The set-screws will easily support the Universal Cable strain, but will not take into account the weight and strain of any connected cables.

Driver Installation for Windows 2000/NT 4.0 and Windows 2003/XP

The sequence of these steps varies depending on the operating system. Refer to the table below for the correct sequence to use.

OS	Installation Sequence	
2000	Part 1	Part 2
2003	Part 2	Part 1
NT 4.0	Part 2	
XP	Part 2	Part 1

Because the installation wizards for all operating systems are similar, the following installation instructions use the Windows 2000 Installation Wizard for the example.

There are two parts to the installation process:

- Installation of Hardware (**Part 1**, on the following page)
- Running the Setup.exe application (**Part 2**, on page 16)

Part 1: Installation Instructions (Hardware)

Note

Uninstall Earlier Versions of Focus Enhancements Cards

If you have previously installed a different type of Focus Enhancements decoder card, or a different version for the Harmony decoder series, it is recommended that you uninstall that driver before proceeding.



Installation and use with Windows 2000, requires Windows 2000 Service Pack 2 or higher.

To complete this installation, it is necessary to point the system to the driver installation disc when prompted by Windows.

The **harmony.inf** file, included on the driver installation disc, should be installed for each of the video channels.

Note

System Identifies Harmony as Multiple Devices

Depending on the Harmony card installed, each channel on the board appears as a unique device (2 or 4) to the system. During installation, the Windows to installation wizard prompts for a driver for each individual video channel.

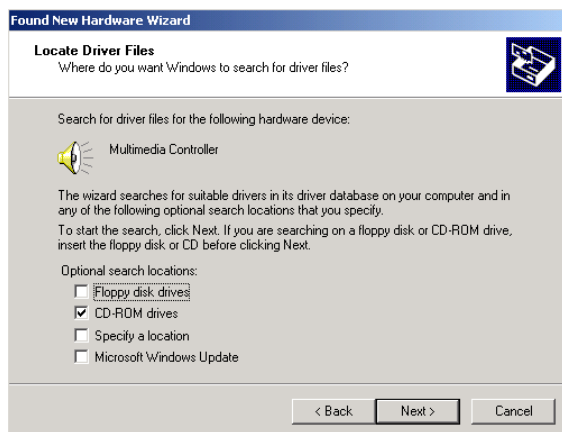
1. Install the decoder card(s) according to the board's user manual.
 - Power up the computer and log in to Windows.
 - The Hardware Manager recognizes that new hardware is in the system and a message box appears stating that Windows has found new hardware.
 - Click **Next** to continue.



2. Select the first option, **Search for a suitable driver for my device**, and click **Next**.



3. When Windows asks for the location of the driver file for this device, select the location of the supplied driver disc and click **Next**.



4. A dialog box appears, stating that this device does not have a digital signature and asks if the installation should continue: click **Yes**.



5. Once Windows has installed the driver for the channel, select **Finish**.



Do Not Reboot System At This Time

If at this time, the system asks if it should reboot, click **NO**. Continue to the next step and install the other channels and cards.

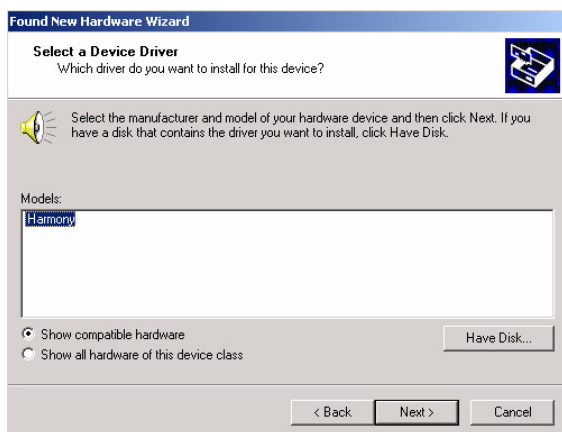
6. The **Welcome to Found New Hardware Wizard Screen** reappears indicating that more new hardware has been found: click the **Next** button to continue.



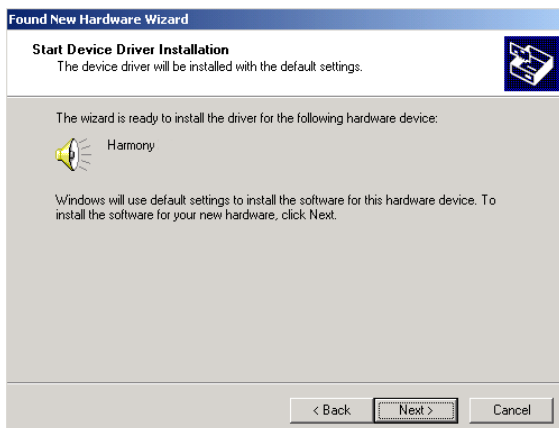
7. Because a Harmony driver is now installed on the system, select the second option, **Display a list of the known drivers ...**, and then click **Next**.



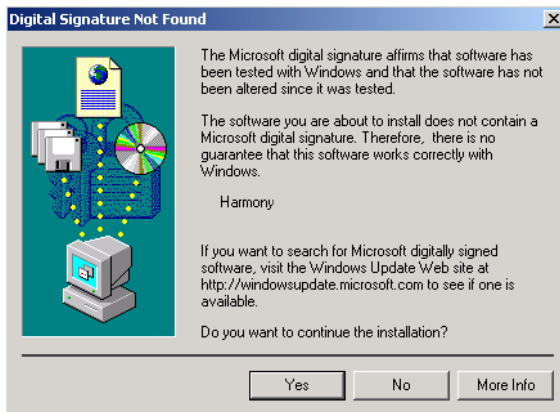
8. The Harmony driver is now in the list and Hardware Wizard displays it under Models. Click **Next** to continue.



9. The wizard is ready to install the device driver. Click **Next** to start the installation.



10. A dialog box appears and states that the device does not have a digital signature and asks if the installation should continue: click **Yes**.



11. Again, once Windows has installed the driver for the channel, select **Finish**.



Do Not Reboot System At This Time

If at this time, the system asks if it should reboot, click **NO**. Continue to the next step and install the other channels and cards.

12. Determine if more drivers need to be installed.
 - If the **Welcome to Found New Hardware Wizard** screen appears again, then return to Step 6 and continue installing the additional channel(s) and/or cards.
 - If the **Welcome to Found New Hardware Wizard** screen does not appear again, then Part 1 of the Installation Instructions is completed.

The driver needs to be installed for each channel.

Part 2: Installation Instructions (Run SetUp.exe)

1. Run the file **SETUP.EXE** from the harmony installation disc.
2. In the setup program setup.exe, there are two installation options to choose from:
 - **Full Driver Install**
Choose this option to install the driver and all software.
During this installation, it is necessary to provide information to configure the driver. The current parameter settings are overwritten.
 - **Update Only**
This option only appears if a previous Harmony driver is currently installed on the system.
Choose this option to copy the new drivers and software onto the system, but leave the current driver settings unchanged.
3. Choose the directory where the application software should be installed.
4. Choose the shortcut folder name to use.
5. Select **Finish** and **Reboot** the system.

Start Menu Icons

Once the system reboots, locate the following icons in the Focus Enhancements group in the Start menu. The manuals require Acrobat Reader, 4.0 or higher.

- **Harmony Driver User Manual** (this manual)
Supplies detailed information on the driver parameters and hardware.

- **Harmony SDK User Manual** (MANL-1088)
Contains information about writing programs that use the driver.
- **Harmony Vidserve**
A player program for testing MPEG files and all of the Harmony board's functionality.
- **Harmony VccReg Parameter Editor**
A utility program for changing driver parameters. Do not use this program unless familiar with the driver settings.
- **Uninstall MPEG-2 Drivers**
An Uninstall utility for all Focus Enhancements driver and application software.

Additional Files

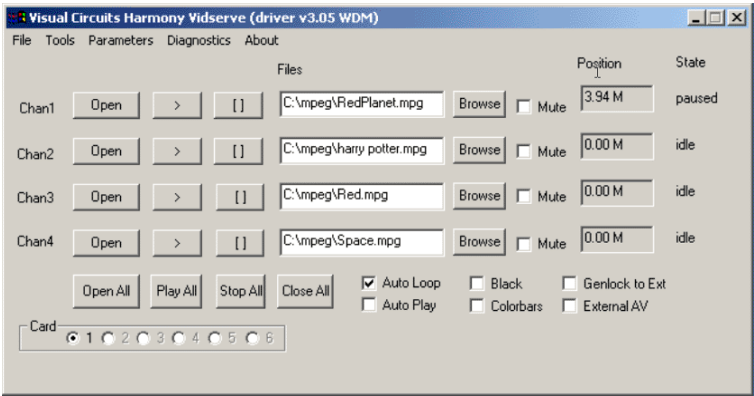
In addition, the following files are also copied to the installation directory selected during the install.

- **Release.doc**
Release notes on the changes in this driver version: Word document.
- **Sdk\Vidserve.zip**
A zipped file containing the Software Development Kit for the driver. This consists of the C source code to the Vidserve player program and all files needed to build it.
- **Sdk\vb_api.zip**
A zipped file containing all files needed to create Visual Basic programs that use the driver. Contains source code to a simple sample program.

Starting Playback

Now that Harmony card is installed:

1. Verify that all software applications are closed.
2. Run **Harmony Vidserve**, the playback application located under Focus Enhancements' programs.



3. Browse for the MPEG file desired and open it.
4. Click **Load** and wait for the position counter to stop moving.
5. Click **>** to start playback.
To pause play, click on **[]**.
6. Repeat the same process to open clips in channels 2, 3, and 4.
7. To change to Card 2 and display its channels, click on button **2**.

Additional information about the Harmony Vidserve main window controls are listed in the following table.

Harmony Vidserve Controls

Control	Description
Open	Opens (loads) the MPEG file selected.
◀ ▶	Plays or resumes play of a stopped file which has been opened (loaded).
[]	Stops a playing channel.

Control	Description
File	Displays the file and full path of the file to be played. You may type the file path or use Browse (see below). For multiple drive servers, be sure to map the file path for each card/channel to the correct drive based on the server specifications.
Browse	Locates the file path of the desired MPEG and opens the file.
Mute	Toggles audio on/off for each channel.
Position	Shows the current file read byte position. (Slightly ahead of actual video playback.)
Open All	Issues an open command to all channels on all boards. (After this command is selected wait until all position counters stop. Now all indicate that the buffers will be loaded. Load time is determined by buffer sizes and system performance.)
Play All	Issues a play command to all channels on all boards.
Stop All	Issues a stop command to all channels on all boards.
Close All	Issues a file close command to all channels on all boards.
Auto Loop	Files continue to playback smoothly and repeatedly. If Auto Loop is deselected during playback, the file will continue to play for one more loop and then stop. To restart Auto Loop select it and then click on the > to start playback.
Auto Play	A play command will automatically be issued after Open. (Do not select this for normal use.)
Black	Toggles between black screen and displaying video on all channels.
Colorbars	Toggles between displaying/not displaying internally generated color bars and on all channels.
Genlock to External AV	Genlocks all channels on currently selected card to external A/V source.
External AV	All channels on currently selected card will output the external A/V source. (Genlock to External should also be checked.)
Card	Selects desired card. The data displayed applies to this board only.

Obtaining Driver and File Information

Drive Information

Driver Diagnostics								
Decoder Type: Harmony 4ES								
	Interrupts	AV Syncs	Last Sync	VideoData	AudioData	Raw Data	Low Disk	Low Data
Chan 1	0	0	0	0	0	0	0	0
Chan 2	0	0	0	0	0	0	0	0
Chan 3	11351303	17819	2	308172	6109	3301116	0	50194
Chan 4	11377886	319082	2	306768	5501	3452668	0	858079
Raw Buffer Size 4128512								
OK								

The Harmony card provides **real-time** performance and diagnostic information about the drive from which video files are drawn. To access this information, select **Diagnostics** from the main menu and then **Driver Info** from the drop down menu.

File Information

File Information

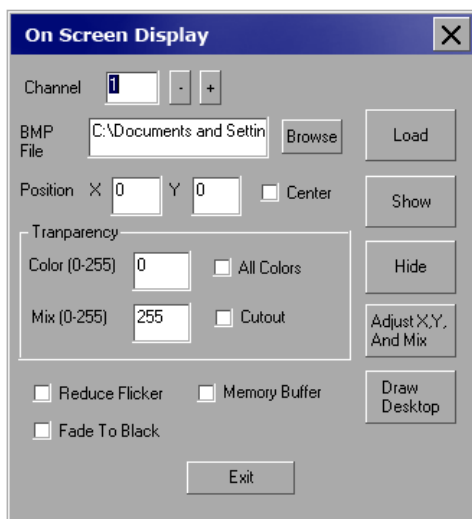
	File Name	HSize	VSize	Video Bitrate	Audio Bitrate	Audio Frequency	Frame Rate	Frame	Timecode	File Type
Chan 1		0	0	0	0	0	0.000	0	00:00:00	unknown
Chan 2		0	0	0	0	0	0.000	0	00:00:00	unknown
Chan 3	Glaze.mpg	720	480	10000000	393216	48000	29.970	4008	00:02:25	mpeg2
Chan 4	Drivethru.mp	720	480	10000000	393216	48000	29.970	218	00:00:07	mpeg2

OK

Harmony supplies **real-time** information about the MPEG files currently playing via the **Diagnostics** tool. To access this information, select **Diagnostics** from the main menu and then **File Info** from the drop down menu.

For more information about the information provided via diagnostics, see **Diagnostics** on page 44.

Inserting an On Screen Display



The **On Screen Display** function provides the ability to position a graphic overlay, such as a company logo or image, on top of the video playback. This function offers the capability of testing and adjusting many of the display's parameters, such as the position on the screen and degree of transparency.

Access the **On Screen Display** by selecting **Tools > On Screen Display** from the drop down menu.

- **Channel** - Set the number of the channel where the display is to appear.

There are three methods for selecting an on screen display.

- **Browse** - select an overlay image to display using the window browse function.
- **Memory Buffer** - Place a check mark in the Memory Buffer box.

This displays an image that is already loaded in the memory buffer. Use the *osdLoadBMPBuffer* command to load an image directly into memory, see **On Screen Display** in the Harmony SDK.

- **Draw Desktop** - does a screen capture of the computer's screen and displays it as an on screen display. This is a way to test other on screen display settings such as position and transparency.

There are a number of functions for adjusting the appearance of the on screen display.

- **Position** - Set the specific location of the graphic over the video using the **X** (left-right) and **Y** (up-down) coordinates or the **Center** check box.

Setting **X = 0**, **Y = 0** positions the graphic overlay to the the upper left corner of the screen.

- **Transparency** - Set the level of transparency of an overlay image using the **Color**, **All Colors**, **Mix**, and **Cutout** controls.

Color selects a specific color, **0 - 255**, from the .bmp palette to be transparent.

All Colors used with **Mix**, this sets all of the colors to be transparent.

Mix sets the amount, **0 - 255**, of transparency: **0** = invisible, **255** = totally opaque.

Cutout automatically selects the color of the pixel in the graphic overlay's lower left hand corner as the keyed color and removes it from the image. Cutout is useful when the image in the overlay is an irregular shape and is surrounded by a solid color background.

- **Reduce Flicker** - Set this control to make the display appear sharper or reduce flickering. Flickering is sometimes seen in images with sharp lines.
- **Fade to Black** - Create an automatic fade-out for the overlay.

Checking the box causes the display to slowly fade to black.

Unchecking causes the image to reappear.

Other on screen display functions are:

- **Load** - Copies the graphic image and it's display parameters to the Harmony onboard memory.
- **Show** - Turns **On** the graphic overlay.
- **Hide** - Turns **Off** the graphic overlay.

- **Adjust X,Y, and Mix** - Click this button to view adjustments made to position and transparency controls.

This control issues the *osdSetXYMix* command and smoothly changes the position and transparency of a displayed overlay.

- **Exit** - Saves changes and closes the **On Screen Display** dialogue box.

Testing Genlock and External Audio/Video

The external audio/video feature allows the insertion of live external audio and video playback, such as a satellite or cable television broadcast, into the presentation mix.

To test external audio/video and genlock, complete the following:

1. Connect an external audio/video source to the Harmony 4ES card (see **DB25 Pinout** on page 74 for details). The Harmony 4ES card accepts a single composite external audio/video input and can distribute the external audio/video to all of the four channel outputs. To select external A/V on a channel-by-channel basis, use the Harmony SDK interface.
2. Check the **Genlock** check box to enable genlock. This will genlock all of the channels on the currently selected card to the external A/V source.
3. If you check the **External A/V** button, all four channels on the currently selected card will output the external audio/video source.

Note

Genlock Must Remain Enabled for External Audio/Video

Do not uncheck the Genlock feature check box while playing back external audio/video. Genlock must be enabled for the external audio/video feature to work properly.

External AV Output Types

Although the input for external audio/video is composite, it can output to a variety of output types; including composite, s-video, RGB and component.

For more information, see **Driver and System** on page 63.

Multi-Card Servers

Mixing 2 and 4-Channel Cards

Both 2-channel and 4-channel Harmony cards may be used in the same server. However, it is important that they be installed with the 2-channel cards in slots closest to the CPU, so that the driver will map the cards and their channels properly. For more information, see **Multiple board server - channels mapped incorrectly** on page 64.

Multi-Threading and Drive Mapping

Depending on hard drive speed and bitrate, proper drive mapping can be crucial for MPEG playback performance. This involves configuring the Harmony driver so that it reads from multiple physical hard drives simultaneously. In a system with two hard drives storing MPEG content, maximum performance occurs when data is read from both drives at the same time.

MaxDisks drive parameter

Use the MaxDisks driver parameter, see **MaxDisks** on page 47, to specify the number of playback storage hard drives used in a system. The driver divides the available playback channels into MaxDisks groups with each group performing concurrent reads; in software terms, each group has a separate thread of execution. Therefore, it is important to configure the application so that each group of channels should read files from a physical hard drive that is not used by another group.

Single drive systems

The MaxDisks default value 1, dictates that reads from all the hard drives are sequential, i.e. only one read of MPEG data occurs at a time. This is acceptable when using a single content drive. However reading from multiple content drives, a read from one drive must complete before a read on another drive can start. This does not take advantage of the performance potential of a multi-drive system.

Multi-drive systems

The use of multiple content drives in a system is useful when it is not possible to store all MPEG content on a single drive or there are multiple channels playing different content. Each channel group has its own drive(s) for content storage.

For simplified mapping, divide the number of channels evenly and sequentially across multiple drives.

Cross-Channel Synchronization

Cross-channel synchronization is a set of functions that provides the capability to synchronize a group of Harmony channels, so that every video output displays the same frame number at the same time. This coordination is active; should one channel drift behind or ahead of the others, the variation is detected and the speed of the channel is adjusted until it is back in sync with the group.

A synchronization group is defined by a master channel which plays normally, and a set of slave channels that follow it, i.e. synchronize with the master channel. A group can have a minimum of 2 channels or a maximum that is the total number of channels on all boards in the system.

The Harmony supports the following cross-channel synchronization features:

- **Multiple synchronization groups**
The Harmony can support multiple synchronization groups.
- **Synchronized files must be the same length in frames.**
To insure that synchronized files start and stop precisely, they must have the same run time, i.e. number of frames.

Note

File Length for Looping Playlists

Likewise, when synchronizing looping playlists, the files playing simultaneously must have the same number of frames to insure that they and the playlists stay synchronized.

- **Synchronization is accurate to +/- one frame between the master and slave channels.**

- Only the master channel in a group can output audio. The slave channels output only video, even when their files have audio tracks, e.g. program stream files.

Cross-channel Sync Commands

The Harmony supports specific serial commands to implement cross-channel synchronization.

- **mpgSyncChannel**
The `mpgSyncChannels` function defines a synchronization group. Once this group is defined it remains active until cancelled with a `mpgUnSyncChannels` or the system is rebooted.
- **mpgUnSyncChannels**
Use to cancel a synchronization group.
- **mpgPlaySyncChannels**
Use to start all channels in a group.
- **mpgStopSyncChannels**
Use to stop all channels in a group.

For a complete description of these and other serial commands supported by the Harmony, refer to the Harmony SDK.

mpgPlay, mpgPlayAll, mpgStop, mpgStopAll

If all channels are part of the same sync group, then the commands, **mpgPlay**, **mpgPlayAll**, **mpgStop** and **mpgStopAll** are interchangeable with their cross-channel counterparts.

Encoding Parameters

Listed below are requirements and recommendations for both Standard and High Definition encoding, that provide criteria to create MPEG files compatible with the Harmony playback system.

1. Files must be one of the following types:
 - Program stream MPEG2 or transport stream MPEG2
 - System stream MPEG1 of audio/video
 - Elementary stream MPEG2
 - Video only, MPEG1
 - Audio only
2. Use **4:2:0** encoding.



Do Not Use 4:2:2 Encoding

3. With MPEG-2, both audio and video fields must be encoded. This is the normal default.
4. Audio only (Dolby Digital or MPEG Layer 2) files cannot be mixed with files containing videos (MPEG, MPEG2 program stream, video only).
5. Total output per 4-channel card (4ES) can not exceed 40 Mbps.
6. The presentation time stamp (PTS) values contained in the audio and video streams in a file must be continuous and increasing.

In particular, the PTS values should not reset to 0 at any point in the file. The time between the first and last time stamps in a file should reflect the actual duration of that file.

7. Files should be no less than 4 MB in size. If there are files smaller than 4 MB, use an editor to combine them into a larger file that is at least 4 MB in size.

Encoding Recommendations

Note

Recommendations Only

Because of the large number of encoders available, Focus Enhancements provides this information as a recommendation only. It may be necessary to perform testing to determine the best settings for the system in use.

1. Resolution:
 - 704 x 480 or 720 x 480 in NTSC
 - 704 x 576 or 720 x 576 in PAL
2. Closed GOP (Group of Pictures) with an “I-frame” every 15 frames is recommended.
3. The recommended audio bit rate is 384 Kbps and a sampling rate of 48 kHz.

Before encoding an entire project, play back the test files using the original source tapes to confirm audio level. This allows for calibration of the encoding system by obtaining a standard audio level.

4. Program stream files should have one end code (00 00 01 b9) at the very end of the file. While the Harmony can handle files without end codes, it is a good encoding practice to include one.
5. The bit rate can affect the size of files used and the ability to transfer them. The following are the recommended bit rates for various types of video content:

Bit Rate	Video Content
4 Mbps	Good quality with low motion
6 Mbps	Good quality with typical motion Recommended
8 Mbps	Good quality with high motion
10 Mbps	Demanding content

6. Although the Harmony can transcode, i.e. convert NTSC to PAL and vice versa real-time, it is recommended to encode to the video standard (NTSC or PAL) that the Harmony is set to display.
7. When encoding files, annotate and store notes on the audio levels of both the source tape and input settings of the encoder. This permits verifying the audio levels of later encoding sessions.

Note

Variations in MPEG Encoding

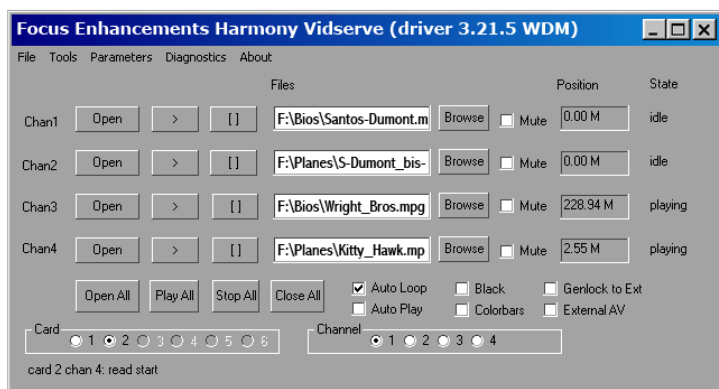
Even when encoding is done at the same production facility, variances between sessions may occur and once MPEGs are encoded, the audio level of a file cannot be changed unless the file is re-encoded or a new audio track is mixed.

Thus, it is desirable to maintain a baseline audio level across all files of a presentation whether at single or multiple locations. If no encoding notes or data are available from previously encoded files, compare the files. When possible, measure the audio levels of the source tapes and of the encoded files. At a minimum, listen to and compare the files.

8. MPEG files are constructed from i.e. multiplexed audio and video streams. If possible, the length of the video and audio stream segments within the MPEG files should be identical. Ending the audio segment at a .5 second interval, i.e., at an "I-frame", ensures identical stream lengths and results in smooth and seamless looping playback.
9. It is recommended that SMPTE tracks should be encoded as hot, at approximately +6db.
This adjustment compensates for some SMPTE information that may be lost during compression. Sample testing should be done with all SMPTE tracks because not all encoders respond in the same way.
10. For reference and calibration, encode into the MPEG files the standard color bars and audio test tones along with the content or source files. These encoded display test and audio tuning files should be separate files, not headers or footers of the presentation.

11. To play back still images or computer-based graphics, hardware-based encoding systems are preferred. However, if a software encoder is needed, we recommend encoders such as DVMPEG (www.darvision.com).

Vidserve



Vidserve is an application that provides the user with the basic tools to:

- Test MPEG files for compatibility with the Harmony board,
- Configure the Harmony board for playback operation.

User Interface

The main dialogue box for the Harmony Vidserve application provides access to a variety of functions and input and information screens. The functions are divided into four categories:

Files

Three functions for accessing existing, saving changes to, and creating new **file sets**. File sets are **.vid** files that contain the information entered in the main Vidserve dialog box and used to specify which video files play on each channel, whether the audio is mute or not, and other playback parameters.

- **Open File Set** opens a selected file set (**.vid**) populates the Vidserve fields with file set data, and displays video on channels.
- **Save File Set** saves displayed parameters to currently selected file set.
- **Save File Set As** provides opportunity to save settings with new name.
- **Exit** Closes Vidserve application.

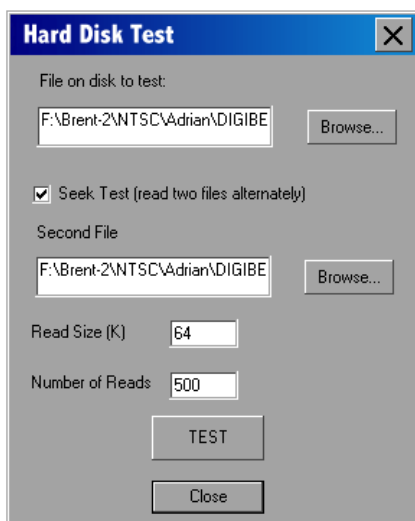
Tools

This tab provides access to a variety of utilities that adjust the content and display, and test performance.

On Screen Display

Controls for selecting, positioning, and displaying a graphic over a video, see **Inserting an On Screen Display** on page 21.

Hard Disk Test



Use to tune performance by testing video files and different read sizes.

1. Select Hard Disk Test.
2. Locate the video file to test.
3. Verify that the **Seek** box is unchecked.
4. Set the **Read Size**.
5. Press **Test**.

Test results appear, showing number of bytes read, length of read time, disk speed, and number of seeks.

6. Adjust drive read size and retest.

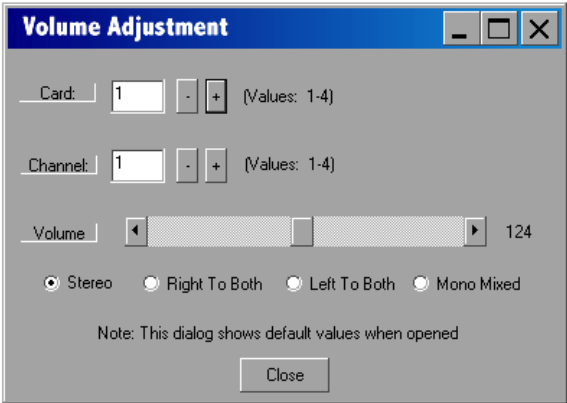
To test reading two files alternatively (**Seek**):

1. Place a check in the **Seek** box.
2. Locate a **Second File** to test.
3. Press **Test**.

Test results appear, showing number of bytes read, length of read time, disk speed, and number of seeks.

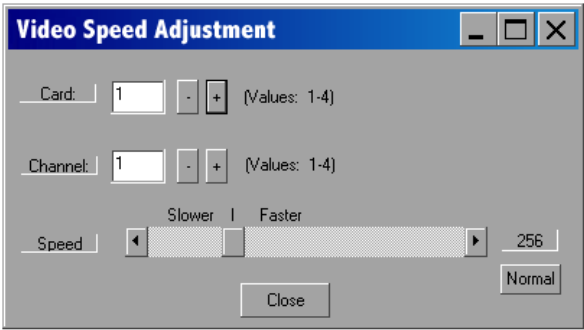
4. Adjust drive read size and retest.

Volume Adjust



Use to set the type of audio and the volume (**0 - 255**) for each channel. For more information, see **Audio/Video Output** in the Harmony SDK.

Video Speed



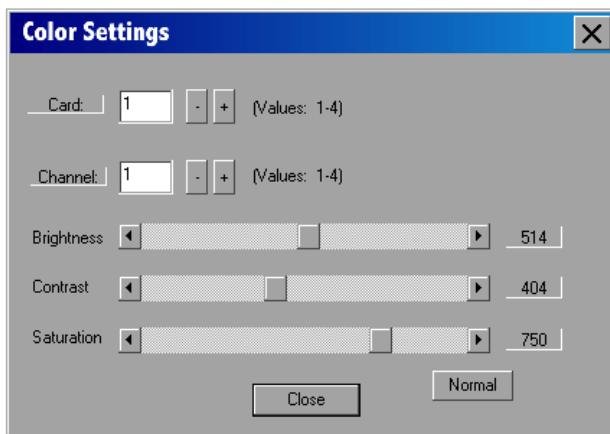
Use to set the rate of playback for each channel.

	range
Slow	0 – 255
Normal	256
Fast	257 - 1024

Audio is muted automatically when the playback speed is changed from Normal (256).

For more information, see *mpgSetVideoSpeed* in the Harmony SDK.

Color Adjust



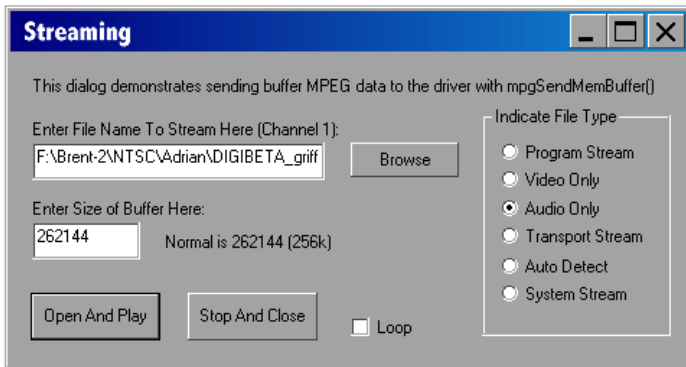
Adjust individual channel's brightness, contrast, and saturation.

	range	default
Brightness	0 – 1000	500
Contrast	0 – 1000	500
Saturation	0 – 1000	500

Press **Normal** to return to default settings.

For more information, see **Audio/Video Output** in the Harmony SDK.

Streaming



This function uses MPEG streaming functions to deliver the MPEG data directly to the driver from a streaming source, rather than requiring the driver to read the data from a file on a drive.

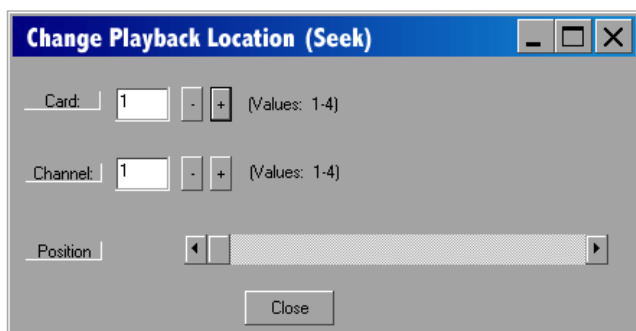
Channel 1 Only

Use to playback or test various file types with different buffer sizes.

1. Select a streaming **File Type**.
2. Browse to find file.
3. Enter **Buffer Size**. Default is **262144** (256Kb).
4. Check **Loop** if video is to repeat.
5. Press **Open And Play** to start playback.
6. Press **Stop And Close** to stop playback.

For more information, see **MPEG Streaming** in the Harmony SDK

Seek Test



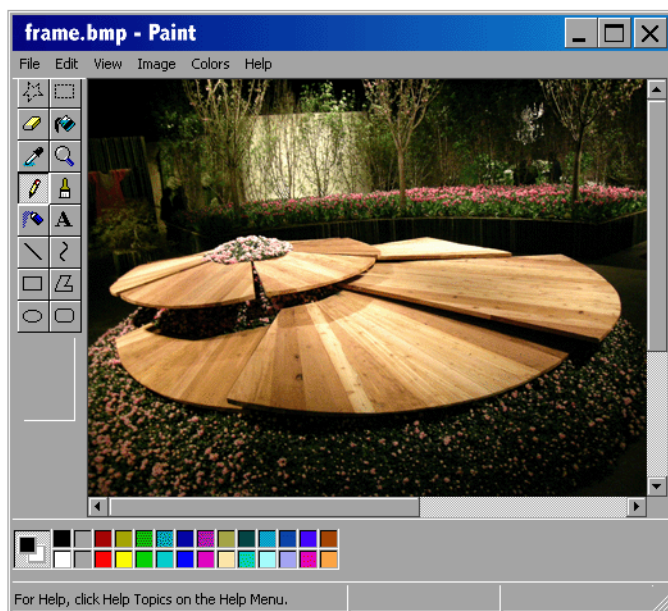
Use to test the seek function.

1. Specify a card and channel.
2. Move slide bar to new location.
3. Verify that the display shows the new position.

When seeking a new position in a file, the video output may display slight distortion, macro-blocks, until the decoder re synchronizes.

For more information, see **File Playback** in the Harmony SDK.

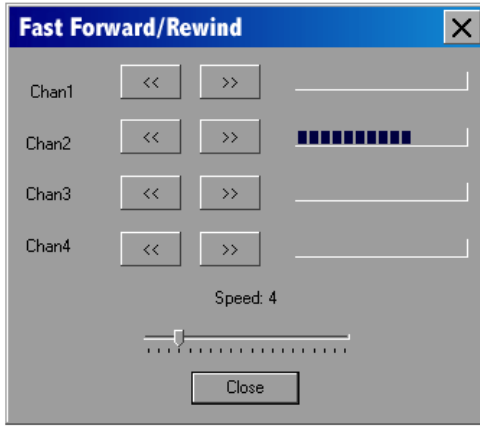
Capture Frame



Use to immediately capture a frame from the video playing on Channel 1, Card 1 and display it as a 24-bit color .bmp file in the Paint window.

For more information, see **Audio/Video Output** in the Harmony SDK.

FF/Rewinds

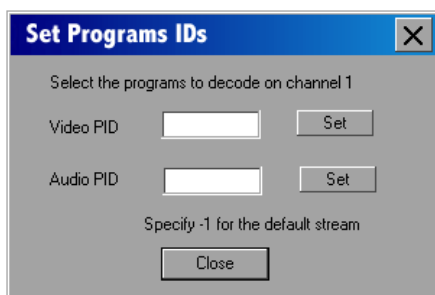


Adjust the speed during **Fast Forward** (>>) and **Rewind** (<<) for individual channels.

1. Click either the >> or the << on a channel.
The scalar bar to the left indicates progress.
2. While observing the video on the display, adjust the sliding speed tab to speed up or slow down.
Audio is automatically muted when playback is not at normal speed.

For more information, see **File Playback** in the Harmony SDK.

Set PIDs



When a multiplexed stream is created its various audio and video streams are automatically assigned unique packet IDs (PIDs) so that at the time of decoding the streams can be reassembled.

Channel 1 Only -- By default, Audio and Video IDs are set to -1, so that all streams are decoded and available for playback. If a specific stream is needed:

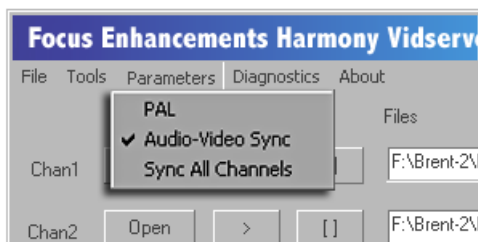
1. Enter the PID number of the audio stream to decode.
2. Click on **Set**.
3. Close the Set Program IDs dialogue box.

For more information, see **File Playback** in the Harmony SDK.

Debug

For Internal Diagnostic Use Only.

Parameters



NTSC/PAL

Select the video mode, **NTSC** or **PAL**.

The computer/server must be restarted after setting to a new video mode (NTSC to PAL or PAL to NTSC).

Audio-Video Sync

Checking this function, the audio and video are always in sync.

Sync All Channels

Checking this function coordinates all channels to start and stop at the same time.

Note

All Files Must Have Same Number of Frames

For Sync All Channels to work, it is necessary that files running in parallel with each other be the same length, i.e. have the same number of frames.

Only Channel 1 (master) Outputs Audio

When Sync All Channels is used, the master channel outputs both its video and audio. The other channels synchronized to it output only video.

For more information, see **Cross-channel Sync Commands** on page 28 and **Cross-channel Synchronization** in the Harmony SDK.

Diagnostics

Two windows providing information about the files currently being played and the performance of the drive where the files are stored.

- **File Info**

Displays the following information for the files currently playing on the selected card:

File Name,

HSize - horizontal resolution in pixels,

VSize - vertical resolution in pixels,

Video Bitrate - bits/sec., divided by 400,

Audio Bitrate,

Audio Frequency - audio frequency, Hz,

Frame Rate - number of frames per second,

Frame - number of current frame being decoded.

This resets to zero at the start of each file, except for video only files

Timecode - last time code decoded, 90000 units per second,

File Type - format of video file, e.g. MPEG,

- **Driver Info**

Displays driver information for the selected decoder card:

Type of decoder card,

Interrupts - number of interrupts since start,

AV Syncs - number of AV syncs since start,

Last Sync - number of frames in last correction,

Video Data - quantity of video data stored on-chip,

Audio Data - quantity of audio data stored on-chip,

Raw Data - quantity of raw data in host memory,

Low Disk - number of times data from disk ran out,

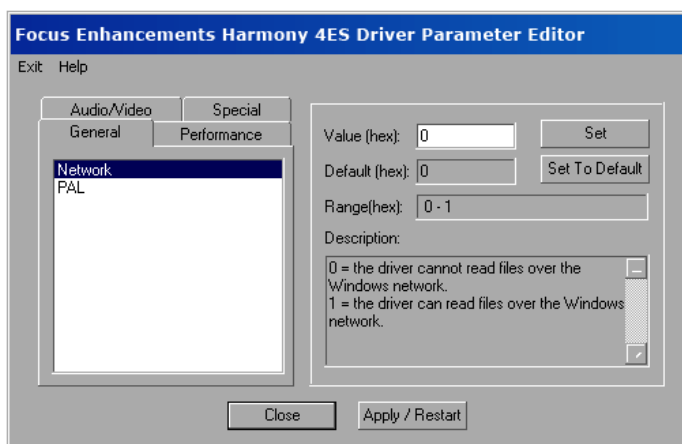
Low Data - number of times decoder underflowed,

Raw Buffer Size - capacity of raw buffer,

For more information about information provided through the diagnostics windows, see **Information**, in the Harmony SDK.

Editing Driver Settings

Driver Editing Utility



Common Driver Parameters

The file, **VccReg.exe** is a driver editing utility designed specifically for editing the VCCmpeg2 driver settings.

There are four tabs containing different parameters, descriptions of these parameters, and driver default settings. The four tabs in Harmony VccReg.exe are **General**, **Performance**, **Audio/Video** and **Special** and are located on the left side of the window. The right side of the window contains the **Value**, **Default**, **Range** and **Description** fields.

To change a parameter, enter the appropriate information in the Value field and click the **Set** button.

To restore the default value, click the **Set To Default** button.

General

Network

0 = The driver cannot read files over the Windows NT network. Default

1 = The driver can read files over the Windows NT network.

Default = 0

Range = 0 - 1

PAL

0 = NTSC

1 = PAL

Default = 0

Range = 0 - 1

Performance

BufferSizePerChannel

Amount of RAM allocated for each channel.

A larger buffer supports larger minimum file reads which reduces hard drive seeking.

400000 hex - recommended for optimal, high performance playback.

Default = 400000 hex

Range = 100000 - 800000 hex

MaxDisks

The number of disk read threads.

The channels are divided into maxdisks groups and each group must play from a different physical drive.

1 = Single MPEG storage drive, normal operation.

Default = 1

Range = 1 - 4

See **Multi-Threading and Drive Mapping** on page 25 for more information.

MaxFileRead

Set the largest file read the driver will perform.

It must be larger than the minfileread parameter.

Setting MaxFileRead to a half of BufferSizePerChannel is recommended.

Default = 20000 hex

Range = Fits evenly in BufferSizePerChannel.

MinFileRead

Sets the smallest file read size the driver will manage.

The larger the MinFileRead is, the less hard drive seeking there will be.

Setting minfileread to one-quarter of BufferSizePerChannel, i.e. one-half MaxFileRead, is recommended.

Default = 100000 hex

Range = Fits evenly in BufferSizePerChannel.

NoCache

0 = Normal NT file system caching is used.

1 = The cache is not grown when files are played.

Default = 0

Range = 0 - 1



NoReadBuffer Preferred Method for Dissolving File Caching

NoReadBuff provides a preferable method to dissolve file caching and should be used instead of NoCache.

For more information, see **NoReadBuff** on page 49.

NonPagedPoolSize

Reserves a block of memory for decoding.

When changing NonPagedPoolSize, the system requires rebooting for Windows NT to allocate memory.

$\text{NonPagedPoolSize} = \text{BuffersizePerChannel} \times 4 \times$
number of cards + 800000 hex

e.g. 1 card: 1800000 hex

2 cards: 2800000 hex

This parameter is set by the installer for the number of cards chosen.

Default = 0

NT/2000 automatically assigns.

Usually too low if there are multiple boards or a large buffer.

NoReadBuff

0 = Normal file caching.

1 = Disables all hard drive caching.



Required to be set to 1 for Windows NT Service Pack 4 or higher.

Default = 1

Range = 0 - 1

Audio/Video

DisableSync

0 = Enables audio/video synchronization.

1 = Disables audio/video synchronization.

Default = 0

Range = 0 - 1

VideoTypes

0 = All channels output S-Video/Composite.

1 = All channels output Component.

2 = All channels output RGB (sync on green).

Default = 0

Range = 0 - 2

Special

InitOnOpen

0 = Files are loaded smoothly without a disturbance to the video output.

1 = The decoder chip is re-initialized whenever a new file is loaded. Output is black after load until it plays.

Default = 0

Range = 0 - 1

Note

Use mpgBlack for Black Screen, Not InitOnOpen

If a black screen is required, use the call mpgBlack rather than this parameter.

InitOnOpen = 1 is a useful diagnostic tool, but may cause anomalies at some transitions.

dontuseints

0 = Normal interrupt driven playback.

1 = Interrupts not used and improves compatibility.

Default = 0

Range = 0 - 1

LateLoadNext

Sets the handling of **mpgLoadNext** calls that arrive after playback has stopped.

0 = Late **mpgLoadNext** calls will be ignored.

1 = Playback will always resume.

Default = 1

Range = 0-1

MaxCards

The number of channels to initialize can be fewer than the actual number of channels in the bus, for testing purposes. (There are four channels on each card).

Default = 8

Range = 1 - 8

Multiapp

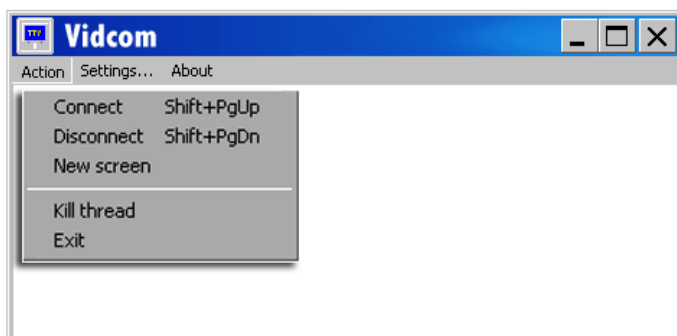
0 = Only one application can link to 4reelapi.dll at a time.

1 = Multiple applications can access the driver, but
callbacks are disabled.

Default = 0

Range = 0 - 1

Vidcom



The Focus Enhancements Vidcom application provides a serial command interface for editing and sending commands via a direct connection to the server.

Connecting directly to the Server

1. Attach to the Harmony host server, via its **RS232** serial COM port, directly to the terminal computer with a **null modem cable** (RS232, female DB-9 to female DB-9).
2. Use the **Vidcom Serial Command Interface** to connect with the Harmony board.
3. Issue commands via **Hyper Terminal**.



Power Down Computer and Server Before Cabling

To protect both the computer and server, verify that both are powered down before attaching the null modem cable.

TTY Settings

TTY Settings ...

COM Options:

Port: COM1

Baud Rate: 9600

Data Bits: 8

Parity: None

Stop Bits: 1

Flow: ☐ DTR/DSR
☐ RTS/CTS
☐ XON/XOFF

TTY Options:

☒ Autowrap
☒ New Line
☐ Local Echo

Control Options:

☐ Use Ctrl_RECEIVE Notification ☒ Display Errors

Font Ok Cancel

Port:	COM1
Baud Rate:	9600
Data Bits:	8
Parity	None
Stop Bits	1

Vidcom Supported Serial Commands

Use Vidcom's simple command interface to manually enter commands channel-by-channel.

File Playback Commands

```

mpgLoad
mpgLoadNext
mpgPlay
mpgPlayAll
mpgStop
mpgStopAll
mpgAutoRepeat
mpgNoRepeat
mpgSeek
mpgSetAudioPID
mpgSetVideoPID
mpgClose
mpgSetInitOnOpen

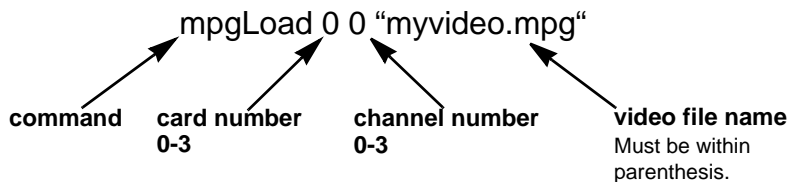
```

Audio / Video Output Commands
mpgMute
mpgUnMute
mpgBlack
mpgUnBlack
mpgColorBarOn
mpgColorBarOff
genSetAudio
genSetVideo
mpgSetVolumeLeftRight
On Screen Display Commands
osdLoadGIF (calls osdLoadBMP)
osdSetXYMix
osdShow
osdHide
Cross-channel Synchronization Commands (after driver V3.12.5)
mpgPlaySyncChannels
mpgStopSyncChannels
mpgUnSyncChannels

For a complete description of for these commands and all serial commands supported by the Harmony, refer to the **Harmony SDK, MANL-1088**.

Command Format

When issuing serial commands use the following syntax:



When a successful command is sent, to the Harmony, it responds with an **ACK** message.

Troubleshooting

Overview

This section contains the following topics:

Overview

Server Setup Check	58
Determining Status of Playback Function	59

Audio/Video Playback

All channels pause when new file starts on a channel	60
Latent Images or flashing during playback	60
No audio	60
No audio or video output	61
Overall block or distorted playback	61
Stuttering files during playback	62
Video blocks or stutters when starting playback	62

Driver and System

BIOS settings	63
Blue screen	63
Harmony driver not found when Vidserve started	63
MPEG does not play from mapped network drive	64
Mouse lags and overall poor system performance	64
Multiple board server - channels mapped incorrectly	64
Multiple boards do not play or they make a few horizontal lines on the screen	65
PCIX system hangs with Harmony	66
Problems using the API	66
SMPTE time codes are not recognized properly	66
Vidserve does not work at all	66

Server Setup Check

Prior to any troubleshooting, power down the system and verify that the card is properly installed in the system's PCI or PCIX slot. Test only one card in the system at a time.

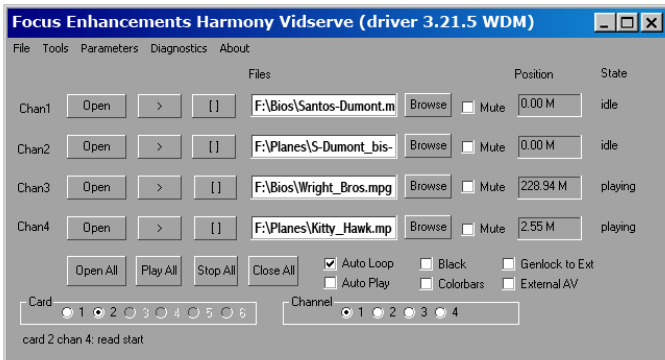
1. Confirm that the system has the power connected properly.
2. Confirm that all video and audio cables are connected properly.
Video output is:
 - Compatible with TVs,
 - Compatible with video monitors,
 - Not compatible with standard VGA computer monitors,
3. Select the correct input type for the display.
Examples: Video 1, Input 1, S-video, etc. Refer to the display manual for use.
4. Remove all serial cable and network connections from the system.

Determining Status of Playback Function

First, determine if the board's playback function is working.

1. Power the server up and open the Harmony Vidservice playback application located under Focus Enhancements programs.

The main window of the application appears.



In the main application window, the **Card** radio button should indicate Card 1 found. If it states **Harmony driver not found** see page 63 for tips on how to fix the error.

2. Verify that the **Auto Play** and **Black** check boxes are **Not Checked** on the main window.
3. Use the Browse button to locate and select a file for **Chan 1** and click **Open**.
4. Note the **Position** window and see that the counter has stopped increasing.
5. Click the **Open** button for channel 1 and verify that the position counter resets completely.
6. Click **Play** for channel 1 and view the video and audio playback.
7. Repeat the process for each channel by browsing, opening and playing files. **Play only one file at a time.**

Audio/Video Playback

All channels pause when new file starts on a channel

- Be sure buffers are fully loaded prior to playing. As the number of channels being used increases, this delay may need to be increased depending on individual server system resources.
- Test with maximum channels playing to determine the system's threshold and maximum delay required.

Latent Images or flashing during playback

- Incorrect source timecode provided or improperly closed encoding session.

If the incorrect timecode for a file on tape is given, it is possible to encode a frame or two of trailer or header information from the tape. Often this "extra" frame may be seen only briefly and may appear as a visual flash on the screen during looping playback. Review the original source material and determine if the timecode are correct for the tape, or if the encoding session was actually started and closed on the correct frames.



Timecode

Timecode is the current playback position, in units of 90000 per second.

No audio

- Make sure mute button is not checked.
- Check cables and test with other audio source.
- When a Dolby Digital encoded file is playing, the analog audio output will be muted.

No audio or video output

- Check that the cables are plugged in properly and that the video and audio outputs are plugged in correctly to the display device. Try testing another channel of the server on the same display. Try using other cables.
- Note that the output of the decoder board will not display on a PC monitor.
- Dolby Digital MPEG files cannot play on the analog Audio output.

Overall block or distorted playback

- Try playing another file or a Focus Enhancements demo file to see if the problem is specific to a file. If so, the data may be corrupt.
- Make sure that NTSC is not being played to PAL or vice-versa (the vertical resolution is 576 in PAL and 480 in NTSC). Set the PAL setting in Harmony VCC Reg to agree with the type of video monitors you are using.
- Possible damage or faulty channel or decoder card. Use test files and try other channels to verify. Always try one file and one channel first as a base line for troubleshooting.
- Verify ATA 133 to ATA 33 compatible components and drivers. A different IDE bus driver may be required for proper system performance.

Stuttering files during playback

Irregular playback on single and multiple channels can be caused by a number of conditions:

- Cross-channel synchronization requires equal playback duration of MPEG files.

If a problem occurs during cross-channel synchronized playback, verify that the file length of matching MPEG files have equal numbers of frames. The Harmony measures file length by frames rather than playback time. In addition check that the bitrate for all channels is equal.

- The bit rate of the MPEG files being played exceed the system capabilities.

The Focus Enhancements MPEG decoder boards and digital servers all have a maximum sustained bit rate that can be delivered. Refer to the system board and specifications for information. Please consult your Focus Enhancements representative prior to encoding or designing your installation if there are any questions.

- Incorrect channel to drive mapping in multi-card systems with multiple content drives. For more information see **Multi-Card Servers** on page 25.



Do Not Mix Harmony 2ES/4ES with Earlier Harmony or ReelTime Boards

Video blocks or stutters when starting playback

- Be sure buffers are fully loaded before calling a playback command. Usually following the initial buffer load, a delay is required.

Driver and System



Unauthorized Repair of Systems Will Void Warranty

Only authorized technicians should perform board troubleshooting or system repairs.

BIOS settings

Ensure that the BIOS settings for Windows servers have the **Non PnP (Plug and Play) OS** selected.

Blue screen

- If a Blue Screen occurs during Windows startup and Windows cannot be started, remove all Harmony cards from the system and reboot.
- Using the process of elimination, test each board by running it in a minimal, single board system configuration, by inserting it into the system and rebooting. Usually starting with the VGA/ AGP card, if it is not integrated into the motherboard.
- Try placing the Harmony card in a different PCI or PCIX slot.

Harmony driver not found when Vidserve started

The error messages listed below are found in your system's **Event Viewer**.

For Windows NT, locate **Administrative Tools**, then open **Event Viewer**.

For Windows 2000, right click on **My Computer**, then open **Manage**, then **Event Viewer** and last **System**.

- **Harmony: Board was not found**
Make sure the board or boards are securely seated in the PCI bus.
- **Harmony: Failed to allocate mem**
Be sure to verify that the **BufferSizePerChannel** is set correctly in Harmony VccReg. Verify all memory is detected by server on start up or by right clicking on **My Computer** and reviewing **General**.

- **Harmony: HARDWARE ERROR**

Inspect the decoder board for damage.

Verify that the motherboard has 3 volts available in the PCI slots.

Remove the board and re-install.

MPEG does not play from mapped network drive

- This will not work unless network = 1, see **Network** on page 46 for details.

Mouse lags and overall poor system performance

- Verify ATA 133 to ATA 33 compatible components and drivers. A different IDE bus driver may be required for proper system performance.

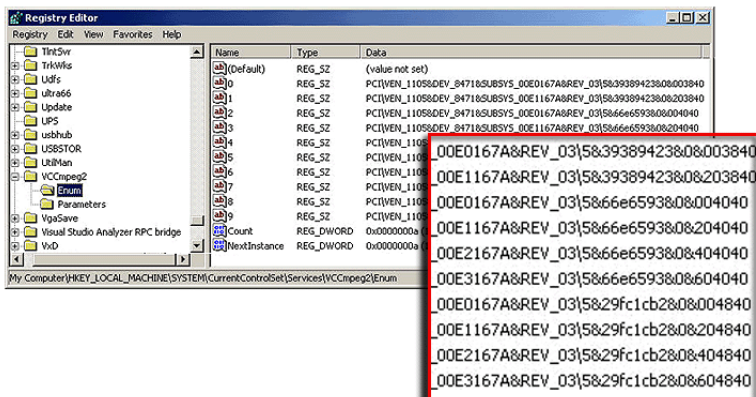
Multiple board server - channels mapped incorrectly

When configuring a server with both 2 and 4-channel boards, the driver incorrectly maps the channel indexes to board / chip index.

Example

A 10 channel configuration CPU, 4-ch board, 4-ch board, and a 2-ch board, with the 2-ch board installed in the slot the farthest away from the CPU.

The device setting in the registry looks like this:

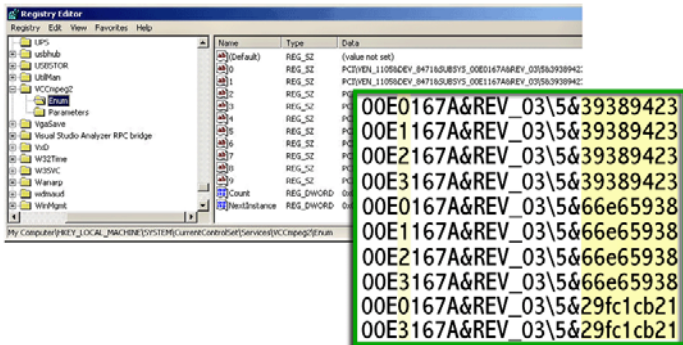


- To correct, reinstall the Harmony cards so that the 2ES, 2-channel card(s) are closet to the CPU.

The driver maps the channel indexes to the boards/ chips, thus:

Channel		Board / Chip
0	→	0 / 0
1	→	0 / 1
2	→	1 / 0
3	→	1 / 1
4	→	1 / 2
5	→	1 / 3
6	→	2 / 0
7	→	2 / 1
8	→	2 / 2
9	→	2 / 3

The device settings in the registry looks like this:



Multiple boards do not play or they make a few horizontal lines on the screen

- Make sure BIOS is not set to PnP operating system.
- Verify number of boards and number of channels using Harmony VccReg.exe driver editing utility.

PCIX system hangs with Harmony

- Verify that PCIX bus speed has been set to match the Harmony board clock speed of 33 MHz.

Problems using the API

- Make sure you are using the standard C calling convention. Refer to the SDK documentation for questions.

SMPTE time codes are not recognized properly

- Some SMPTE tracks lose information during compression and may not “trigger” events as required. Testing is essential to account for variances in encoders and SMPTE devices involved.

Vidserve does not work at all

- Only one program can access the driver at a time. Close all programs using the Harmony driver and run Harmony Vidserve again.

Contacting Focus Enhancements

Support for Users

If the Harmony decoder board is experiencing problems, first consult **Troubleshooting** on page 57 and the support information available at **www.focusinfo.com**. Then, if more help is needed, please contact a Focus Enhancements Value Added Reseller or Distributor.

Before calling for support

Before calling for support, collect the following information:

Information needed by Technical Support

Serial Number of Harmony board: _____

Date of Purchase: _____ / _____ / _____

Name of Seller: _____

Complete description of problem:

Support for VARs and Distributors

Value Added Resellers (VAR) and Distributors of Focus Enhancement's Focus Enhancements products, can call Focus Enhancement's technical support. Calls are handled in the following manner:

1. A technical support representative records the information provided by the User: board serial number, date of purchase and seller, and problem description.
2. Technical Support attempts to resolve problem over the telephone.
3. If the problem can not be resolved during the initial conversation, the representative arranges for a follow up call and provides a reference number to use while tracking work on the problem.

Note

After Regular Business Hours

If the support call occurs after regular business hours, CST, and the problem is not immediately resolved, the support engineer arranges for a call back the following business day.

VARs and Distributors Returning Materials to Focus Enhancements

If the problems with the Harmony board can not be corrected over the telephone, it may be necessary to return the board to Focus Enhancements, Midwest Headquarters.

All materials shipped back to Focus Enhancements must be accompanied by a Return Materials Authorization (RMA) number. Contact Focus Enhancements Technical Support to receive a RMA number.

Write the RMA number clearly on the shipping label.



Focus Enhancements
Attn: Technical Support
RMA 1234567890

Contact Information

USA

Office Hours: Monday through Friday
8:00 AM to 5:00PM (Central Time)

Email: support@focusinfo.com

Telephone: +1 763-398-1658

Fax: +1 763-571-7688

Address: Focus Enhancements, Inc.
1370 Dell Avenue
Campbell, CA. 95008
www.focusinfo.com

EMEA (Europe, Middle East, Africa)

Office Hours: Monday through Friday
9:00 AM to 5:00PM

Email: techsupport@como.com

Telephone: +49 4307 - 83 58 58

Fax: +49 4307 - 83 58 99

Address: COMO Computer & Motion GmbH
A Focus Enhancements Company
Lise-Meitner-Str. 15
24223 Raisdorf / Germany
www.focusinfo.com

Appendix

This Appendix contains:

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AV Breakout Cables

Specifications

Feature	Description
Physical	Length = 9.4" (239mm) Height = 4.25" (108mm)
Connectors	25-pin D-Sub (use with universal breakout cable.) Dual 3.5 mm jacks for digital audio output.
Power	All active channels: <ul style="list-style-type: none">• 10.5w Typical (playback to TV) PCI Voltages <ul style="list-style-type: none">• +3.3V 2.8A (TV)• +12V 0.09A• -12V Not used
Audio Parameters	Sampling rates supported: <ul style="list-style-type: none">• 32khz,• 44.1 khz,• 48khz,• 96 khz Frequency response: <ul style="list-style-type: none">• 20hz - 22khz +/- .5db MPEG layer 2 audio, Dolby Digital <ul style="list-style-type: none">• Stereo 16 bit,• 20 bit,• 24 bit output, Passes Dolby Digital via S/PDIF connector. Volume, balance software controllable Volume, balance software controllable Software controllable mute Software controllable stereo channel routing (mono, dual mono, right or left, etc.) Audio output level: -10dB Audio output impedance: 10K Ohms/unbalanced

75-ohm resistance is recommended for all cables used for video outputs and inputs.

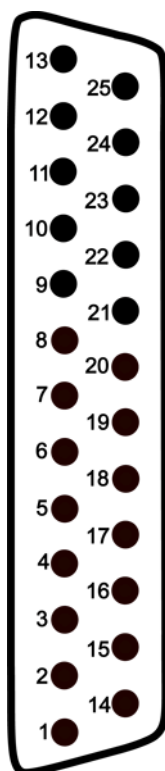
When attaching the leads, solder cup connectors work fine, but crimp type pins provide more durability and hold up better under strain. An example of a cable that works well for video is the Belden series 9221 mini-coaxial cable (www.belden.com), but other cable manufacturers can also be used.

Audio lines need to be quality audio wire. An example of a compatible audio cable is the Assmann Electronics AK243-2 3.5 mm stereo to 2 phono plugs cable (www.assmann.com). Note that two separate audio cables will be required to connect all 4 channels: one cable for channels 1 & 2 and the other for channels 3 & 4.

Ensure that all leads are properly grounded within the D-Sub and that proper strain relief is provided to prevent separation of wires from the pins or connectors. Also ensure that all connectors, whether BNC, RCA, or other are of high-quality material so as not to break the 75-ohm impedance of the line.

DB25 Pinout

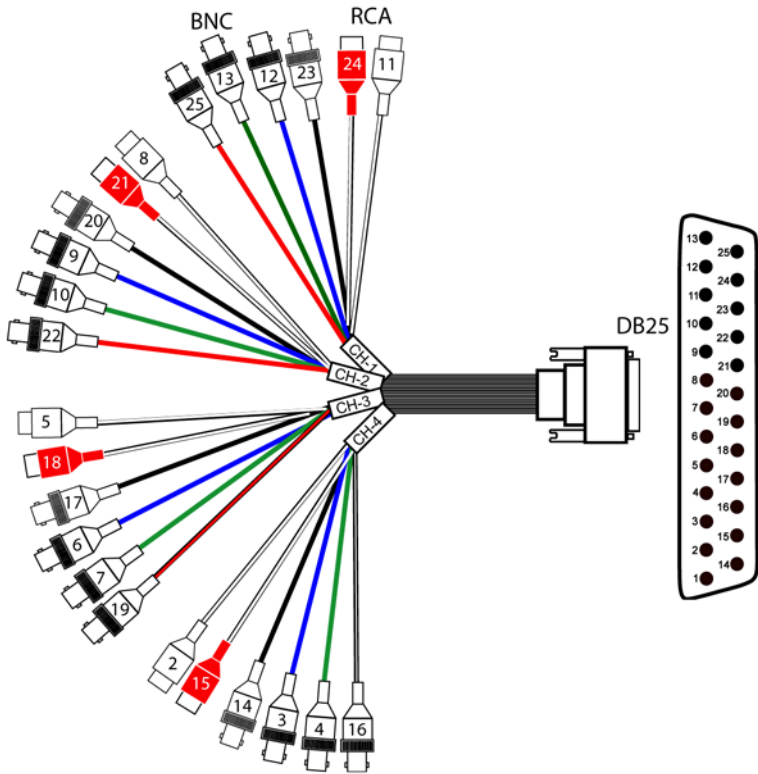
Refer to the following chart for pin-out connections.



Pin	Harmony
1	GROUND
2	AUDIO L/3
3	COMP 3 / BLUE 3
4	LUMA 3 / GREEN 3
5	AUDIO L/2
6	COMP 2 / BLUE 2
7	LUMA 2 / GREEN 2
8	AUDIO L/1
9	COMP 1 / BLUE 1
10	LUMA 1 / GREEN 1
11	AUDIO L/0
12	COMP 0 / BLUE 0
13	LUMA 0 / GREEN 0
14	NOT USED
15	AUDIO R/3
16	CHROMA 3 / RED 3
17	AUDIO IN R
18	AUDIO R/2
19	CHROMA 2 / RED 2
20	AUDIO IN L
21	AUDIO R/1
22	CHROMA 1 / RED 1
23	VIDEO IN
24	AUDIO R/0
25	CHROMA 0 / RED 0

Ground Pin 1 to case of D-sub.

Universal Cable



This universal cable design is provided by Focus Enhancements to assist users with their cabling requirements.

iNote

Purchasing Cables

Focus Enhancements does not stock or sell cables, cable components or cable building supplies. Please contact an Audio/Video specialist for assistance.

Harmony

Specifications

Feature	Description
Physical	Length = 9.4" (239mm) Height = 4.25" (108mm)
Connectors	25-pin D-Sub (use with universal breakout cable.) Dual 3.5 mm jacks for digital audio output.
Power	All active channels: <ul style="list-style-type: none">• 10.5w Typical (playback to TV) PCI Voltages <ul style="list-style-type: none">• +3.3V 2.8A (TV)• +12V 0.09A• -12V Not used
Audio Parameters	Sampling rates supported: <ul style="list-style-type: none">• 32khz,• 44.1 khz,• 48khz,• 96 khz Frequency response: <ul style="list-style-type: none">• 20hz - 22khz +/- .5db MPEG layer 2 audio, Dolby Digital <ul style="list-style-type: none">• Stereo 16 bit,• 20 bit,• 24 bit output,• Passes Dolby Digital via S/PDIF connector. Volume, balance software controllable Volume, balance software controllable Software controllable mute Software controllable stereo channel routing (mono, dual mono, right or left, etc.) Audio output level: -10dB Audio output impedance: 10K Ohms/unbalanced

Feature	Description
Video Parameters	<p>Output level composite video: 1 volt peak-to-peak when terminated with 75ohms</p> <p>Output level RGB (RT+): .7v peak-to-peak when terminated with 75 ohms</p> <p>Standards: NTSC or PAL software selectable</p> <p>Encoder: Broadcast quality digital video encoder with post filtering</p> <p>Resolution: CCIR 601 720x480 NTSC or 704 x 576 PAL</p> <p>Driver supports automatic selection of SIF format for MPEG1</p>
Supported Standards	<p>ISO 11172 (MPEG-1)</p> <p>ISO 13818 (MPEG-2)</p> <p>Maximum bitrate:</p> <ul style="list-style-type: none"> • Single card server: Individual channel can play up to 15mbps (mbits/second). Maximum total bit rate to card is 60mbps. • Multi-card server (up to four cards): combined bit rate not to exceed 150mbps.
Bus Interface	<ul style="list-style-type: none"> • Conforms to PCI-bus electrical specifications 2.1. • Operates in bus master mode. • Can use 3.3v if available on bus.
Environment	<p>Ambient temperature:</p> <ul style="list-style-type: none"> • Operating: 0 deg C to 40 deg C • Non-operating: -40 deg C to 60 deg C
Minimum System Requirements	<p>Minimum processor:</p> <ul style="list-style-type: none"> • Intel or AMD-based 600MHz/equivalent. • 1 GHz or higher recommended. <p>Minimum system memory:</p> <ul style="list-style-type: none"> • 256 MB PC-100 (PC-133 recommended). <p>Hard disk: Ultra ATA/66 or higher.</p> <p>Audio receiver:</p> <ul style="list-style-type: none"> • Dolby Digital audio receiver/decoder and speakers required for surround sound.

Still Images and Computer-based Graphics

The information contained in this section outlines useful techniques for creating still images and computer based graphics for use in video.

Whether you are creating graphics that will be converted to digital video or simply creating images that will be used as graphic overlays, follow the guidelines below to make your content more visually appealing and your desired message more effective.



These guidelines serve only as recommendations and by no means represent technical data pertinent to any specific encoding device or process. It is recommended prior to beginning any encoding project, sample files are played back on the systems to be used to ensure proper display quality.

Screen Resolution and Pixels vs. DPI

Graphics that will be converted into MPEG2 should have a resolution of 720x480 pixels.

Most graphics creation programs can be setup to use pixels as a unit of measure instead of DPI. DPI (dots per inch) is used for printing purposes and is not relevant to video. There is a relationship-- the number of pixels will be equal to the DPI value set in the software times the size of the canvas or printed output size.

For example, suppose an image from a digital camera has a resolution of 1000x500 pixels. If the printing software chooses 100 DPI, then the printed image will be 10 inches by 5 inches. If 250 DPI is chosen, then the image will be 4 inches by 2 inches.

When producing MPEG2 digital video, the “canvas size” is 720x480 pixels, and so to create a bitmap that will be part of a composite image, the number of pixels should be chosen to be smaller than 720x480. This means that a 72 DPI graphic that is rendered out to 10 inches horizontally will fill the entire width of one video line.

Progressive vs. Interlace (Field Rendering)

Computer monitors use progressive interlace, which means that each scan line is done in order from the top of the screen to the bottom.

Video monitors use interlacing, which means that the even lines are followed by the odd lines.

- It is important to avoid single horizontal lines, as they will flicker. This flicker comes from the fact that the line is off on one field and on in the other. Use anti-aliasing on all lines and/or use thicker lines to avoid this flicker problem.
- Most computer graphics programs have an option for “field rendering”. This should be selected if the animation will be displayed on a video monitor or television.

Color Issues

The range of color that NTSC can produce is different from the range of RGB values that a computer monitor can display.

Color produced outside the range of acceptable NTSC values are called “illegal values” because they have the potential to interfere with broadcasting parameters and can cause problems like interference with adjacent channels.

This can also happen in cable channels where the text from “bulletin board” type displays can bleed into another channel. In particular, excessive red can cause severe problems on a television screen or video monitor.

- It is best to keep any value for red, green, or blue under a value of 234. For example, pure red for video purposes should be 234,0,0 (hex EA0000), and it is preferable to make it more of an orange color.
- Pure white should not exceed 234,234,234, but it is better to avoid pure white because it can cause text on top of it to flicker excessively.
- Pure black works well as a background for most colors, but pure black (0,0,0) should not be used. Television black should be 18,18,18 to stay within the legal range of colors.

- Do not use white or red backgrounds that have more than 80% saturation.

There are utility programs, such as Hijack and Debabelizer, that will translate computer graphics into video-friendly colors.

Adobe Photoshop includes a filter for NTSC colors.

Using the “Image Adjust” function in Photoshop to reduce the brightness and contrast by about 25% will make the video image better.

NTSC Safe Title Area

Unlike a computer monitor or a plasma display, television monitors have some amount of “overscan”. This means that graphics that are near the edges of the screen on a computer monitor will not be seen on a television monitor.

The exact amount of this overscan will vary widely, but it is generally considered safe to:

- Put graphics 10% of the distance from the edges. This would mean that all graphics should be in the range of 72-648 horizontally and 48-432 vertically.

The aforementioned guidelines still do not guarantee that graphics will be seen.

The “safe title” area is where text should be placed to be sure that it will be displayed.

- The safe title area value is 20% from the edges. This equates to the text being placed in the range of 144-576 horizontally and 96-384 vertically.

Text

- A font size of less than 12 points will usually be unreadable on a video monitor or television. A minimum size of 14 points can be used for “fine print”; however, much larger text should be used for the text to be legible in video.
- Anti-aliasing should always be selected for text.
- Detailed backgrounds should be avoided.

Patterns

- Areas of high-contrast will create artifacts on a video screen. This can be seen on a television screen when a person has a herringbone or checked pattern on a suit or tie.

When reducing colors to make a GIF from Adobe Photoshop, make sure that the “dither” box is not checked.

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